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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/814,475

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Hiroshi Suzuki

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EXAMINER

DILLON, SAMUEL A

ART UNIT

PAPER NUMBER

2185

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Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/814,475	SUZUKI ET AL.	
	Examiner	Art Unit	
	Sam Dillon	2185	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 August 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/30/04 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |                                                                                         |                                                                             |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                                |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____                                                             | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 23, 2006 has been entered. Per the amendment, Claims 1, 2, 9, 11 and 15 have been amended.
2. The instant application having Application No. 10/814,475 has a total of 20 claims pending in the application; there are 5 independent claims and 15 dependent claims, all of which are ready for examination by the examiner.

#### **I. RESPONSE TO AMENDMENT(S) / ARGUMENT(S)**

3. Applicant's arguments with respect to the disclosures of Hubis and McIlroy have been fully considered, but are moot in view of the new ground(s) of rejection, as described below.

#### **IV. REJECTIONS NOT BASED ON PRIOR ART**

##### **Claim Rejections - 35 USC ' 112**

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. **Claims 16-19** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
6. **Claims 16-19** recite the limitation "*said connected state value*". There is insufficient antecedent basis for this limitation in the claims. For the purposes of further examination, the Examiner will read the claims as reciting "*a connected state value*".

## VII. **REJECTIONS BASED ON PRIOR ART**

### **Claim Rejections - 35 USC ' 102 - Hubis**

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. **Claims 1-4, 6, 9-11 and 15** are rejected under 35 U.S.C. 102(b) as being anticipated by Hubis et al. (*US Patent Number 6,343,324*).
9. As per **Claim 1**, Hubis discloses an input/output management system for managing input or output from or to a disk device (*Hubis, disk drive storage array, column 3 lines 62-65*) connected to a computer (*host 1, Figure 2A*), comprising:
- a connection information definition block (*NURAM 182, Figure 2A*) in which the relationship of logical connection (*port mapping table entry 190, Figure 2B-3*) between said computer and a logical volume (*logical volume, column 10 line 33*) included in said disk device or a logical area (*logical volume, column 10*

*line 33) in a logical volume (physical disc drive, column 10 line 32) is defined;*  
and

an input/output execution control block (*processor 180, Figure 2A*) that controls, based on the definition, whether said computer can access a logical volume included in said disk device or a logical area in a logical volume (*column 4 lines 6-8*).

The Examiner notes that though Hubis discloses both limitations “*a logical volume included in said disk device*” and “*a logical area in a logical volume*”, Hubis need only disclose one to serve as a valid rejection.

10. As per **Claim 2**, Hubis discloses an input/output management system for managing input or output from or to a disk device (*disk drive storage array, column 3 lines 62-65*) connected to a plurality of computers (*plurality of computers, column 4 line 3 and host 1 through M, Figure 2A*), comprising:

a connection information definition block (*NURAM 182, Figure 2A*) in which the relationship of logical connection (*port mapping table 190, Figure 2A*) between each of said computers and a logical volume (*storage volume 108, column 4 line 48 and logical volume 1, Figure 2A*) included in said disk device or a logical area (*logical volume, column 10 line 33*) in a logical volume (*physical disc drive, column 10 line 32*) is defined using computer identification information (*unique identifier, column 4 line 5*); and

an input/output execution control block (*processor 180, Figure 2A*) that controls, based on the definition, whether each of said computers can access a

logical volume included in said disk device or a logical area in a logical volume  
(column 4 lines 6-8).

11. As per **Claim 3**, Hubis discloses an input/output management system according to Claim 1, wherein said connection information definition block comprises:

a computer identification information definition division (*host computer ID map data structure, column 4 lines 10-11*) in which physical identification information (*host computer ID, column 4 line 10*) that uniquely indicates said computer connected to said disk device is defined.

12. As per **Claim 4**, Hubis discloses an input/output management system for managing input or output from or to a disk device connected to a computer according to Claim 1, wherein said connection information definition block comprises:

a computer identification information definition division (*port mapping table 190, Figure 2B-3*) in which the relationship of logical connection (*port mapping table entry 191, Figure 2B-3*) between said computer and a logical area in a logical volume included in said disk device is defined using computer identification information (*host index 151, Figure 2B-3*).

13. As per **Claim 6**, Hubis discloses an input/output management system according to Claim 1, wherein said connection information definition block comprises:

a computer identification information definition division (*port mapping table 190, Figure 2B-3*) in which the relationship of logical connection (*port mapping table entry 191, Figure 2B-3*) between said computer and a logical volume included in said disk device is defined using port numbers (*i/o processor number*

*column in port mapping table, Figure 2B-3) assigned to the ports of said disk device connected to said computer (port 114-1 through port 114-M in Figure 2A).*

14. As per **Claim 9**, Hubis discloses an input/output management method for managing input or output from or to a disk device (disk drive storage array, column 3 lines 62-65) connected to a computer (host 1, Figure 2A), comprising the steps of:

defining the relationship of logical connection (*NURAM data structures 182, Figure 2A*) between said computer and a logical volume (*logical volume, column 10 line 33*) included in said disk device or a logical area (*logical volume, column 10 line 33*) in a logical volume (*physical disc drive, column 10 line 32*);

and controlling, based on the definition, whether said computer can access a logical volume included in said disk device or a logical area a logical volume (*column 4 lines 6-8*).

15. As per **Claim 10**, Hubis discloses an input/output management method according to Claim 9, wherein

the definition of the relationship of connection contains physical identification information (*host world wide name list 153, Figure 2B-1*) that uniquely indicates said computer connected to said disk device.

16. As per **Claim 11**, Hubis discloses an input/output management method for managing input or output from or to a disk device (disk drive storage array, column 3 lines 62-65) connected to a computer (host 1, Figure 2A), comprising the steps of:

defining, based on computer identification information (*host world wide name list 153, Figure 2B-1*) and logical volume connection information (*volume*

*permission table 194, Figure 2B-3), the relationship of logical connection (port mapping table 190, Figure 2B-3) between said computer and a logical volume (logical volume, column 10 line 33) included in said disk device or a logical area (logical volume, column 10 line 33) in a logical volume (physical disc drive, column 10 line 32); and*

controlling, based on the definition, whether said computer can access a logical area in a logical volume included in said disk device (*column 4 lines 6-8*).

17. As per **Claim 15**, Hubis discloses a disk control program for implementing a method of processing information based on which input or output from or to a disk device (*disk drive storage array, column 3 lines 62-65*) connected to a computer (*host 1, Figure 2A*) is managed, wherein said method comprises the steps of:

defining the relationship of logical connection (*NURAM data structures 182, Figure 2A*) between said computer and a logical volume (*logical volume, column 10 line 33*) included in said disk device or a logical area (*logical volume, column 10 line 33*) in a logical volume (*physical disc drive, column 10 line 32*) on the basis of both physical identification information (*host world wide name list 153, Figure 2B-1*) that uniquely indicates said computer connected to said disk device, and logical volume connection information (*permission column 195, Figure 2B-3*) that contains a connected state value (*permission value 195, Figure 2B-3*) concerning the connection of said computer to each logical volume included in said disk device or each logical area in each logical volume; and



controlling, based on the definition, whether said computer can access a logical volume included in said disk device or a logical area a logical volume (column 4 lines 6-8).

18. As per **Claims 16-20**, but more specifically to Claim 16, Hubis discloses an input/output management system according to Claim 1, wherein if said connected state value (permission value 195, Figure 2B-3) is an intermediate value (the permission value is a flag, and therefore does not have an intermediate value), then:

*(The Examiner notes that the structure of the claim is such that if the connected state value is NOT an intermediate value then there is no further limitation to the claimed subject material. As Hubis' permission value does not have an intermediate value, the rest of the claim accordingly is not given patentable weight.)*

If an access key is not appended to an input/output request issued by said computer, said computer is treated as fully disconnected;

If an access key is appended to an input/output request issued by said computer and if said access key is larger than said connected state value, input/output for said input/output request is disabled; and

If an access key is appended to an input/output request issued by said computer and if said access key is equal to or smaller than said connected state value, input/output for said input/output request is enabled.

**Claim Rejections - 35 USC ' 103 – Hubis and King**

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. **Claim 5, 7 and 12** are rejected under 35 U.S.C. 103(a) as being unpatentable over Hubis et al (*US Patent Number 6,343,324*) in view of King et al ("*Operating System Support for Virtual Machines*").

21. As per **Claim 5**, Hubis discloses an input/output management system according to Claim 4, wherein

computer identification information (*host index 151, Figure 2B-3*) concerning said computer is specified in said computer identification information definition division (*port mapping table 190, Figure 2B-3*), and said input/output execution control block controls whether said computer can access a logical area in a logical volume included in said disk device (*column 4 lines 6-8*).

Hubis does not disclose said computer including a plurality of logical computers, wherein computer identification information concerning each of said logical computers is specified in said computer identification information definition division, and said input/output execution control block controls whether each of said logical computers that share the same physical input/output path can access a logical area in a logical volume included in said disk device.

King discloses a computer (*computer system, section 1 paragraph 1 lines 2-3*) including a plurality of logical computers (*virtual machines, section 1 paragraph 2 lines 5-6*),

wherein computer identification information concerning each of said logical computers (*host index 151, Figure 2B-3, see interpretation below*) is specified in said computer identification information definition division, and

said input/output execution control block controls whether each of said logical computers that share the same physical input/output path can access a logical area in a logical volume included in said disk device (*King, figure "Type I VMM", see interpretation below*).

The virtual machines run inside the client computer (*King, figure "Type I VMM"*) and as said client computer's access over its physical input/output path is controlled by the input/output execution control block, inherently so would the virtual machines. Additionally, the computer identification associated with each of said logical computers (*host index 151, Figure 2B-3*) is identical and is specified in said computer identification information definition division.

King and Hubis are analogous art in that they both deal with systems of multiple and heterogeneous host computers. It would have been obvious to someone with ordinary skill in the art to run the plurality of virtual machines taught by King on the client computer in Hubis' input/output management system.

King states that virtual machines can be used to provide a software environment for debugging operating systems that is more convenient than using a physical machine

(*section 1 paragraph 2 line 13-15*) and provide a convenient interface for adding functionality (*section 1 paragraph 2 line 15-19*).

Therefore, it would have been obvious to combine the host taught by Hubis with the virtual machines taught by King for the benefit of debugging and conveniently adding functionality, to obtain the invention as specified in claim 5.

22. As per **Claim 7**, Hubis and King disclose an input/output management system for managing input or output from or to a disk device connected to a computer according to Claim 1,

wherein the definition (*Hubis, port mapping table 190, Figure 2B-3*) is used to control whether each of application programs running in said computer (*King, guest applications, figure "Type I VMM"*) can access a logical volume included in said disk device or a logical area in a logical volume (*Hubis, column 4 lines 6-8*).

King discloses multiple applications running in a virtual machine (*guest applications, figure "Type I VMM"*). The virtual machines run inside the client computer (*King, figure "Type I VMM"*) and as said client computer's access over its physical input/output path is controlled by the input/output execution control block, inherently so would the virtual machines.

23. As per **Claim 12**, Hubis and King disclose an input/output management method according to Claim 9,

wherein whether each of a plurality of application programs running in said computer (*King, guest applications, figure "Type I VMM"*) can access a logical

volume included in said disk device or a logical area in a logical volume is controlled (*Hubis*, column 4 lines 6-8).

**Claim Rejections - 35 USC ' 103 – Hubis and Tang**

24. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Hubis et al (US Patent Number 6,343,324) in view of Tang et al (“Load Distribution via Static Scheduling and Client Redirection for Replicated Web Servers”).

25. As per **Claim 13**, Hubis discloses an input/output management method according to Claim 11, wherein a plurality of pieces of definition information (*port mapping table entry 191, Figure 2B-3*) define whether said computer or each of a plurality of application programs running in said computer can access a logical volume included in said disk device or a logical area in a logical volume (*column 4 lines 6-8*). Hubis does not disclose the plurality as being automatically switched with the start of each of time zones according to a predefined schedule.

The limitation “*said computer or each of application programs running in said computer*” can be fulfilled by one or more of the limitations “*said computer*” or “*each of a plurality of application programs running in said computer*”.

Tang discloses a plurality of pieces of definition information as being automatically switched (*section 2 item 2 lines 3-5*) with the start of each of time zones (*period of  $T_s$ , section 2 item 2 line 3*) according to a predefined schedule (*section 2 item 2*).

Hubis and Tang are analogous art in that they deal with managing the connection relationship between clients accessing data from one of a plurality of storage locations. It would have been obvious to someone with ordinary skill in the art to schedule connections in Hubis' storage system with Tang's scheduler.

Tang discloses that using a scheduler allows user-specific data to be migrated or located at a specific storage location (*section 1 paragraph 3 lines 11-13*) while still keeping the load on each storage location balanced (*section 1 paragraph 3 lines 13-14*).

Therefore, it would have been obvious to combine the storage system taught by Hubis with the scheduler taught by Tang for the benefit of minimizing data replication and balancing the load on each storage location, to obtain the invention as specified in Claim 13.

Though not required for the current rejection, the Examiner notes that as per the rejection of Claim 7, King (*"Operating System Support for Virtual Machines"*) discloses a computer (*computer system, section 1 paragraph 1 lines 2-3*) including a plurality of applications (*guest applications, figure "Type I VMM"*).

**Claim Rejections - 35 USC ' 103 – Hubis, King and Tang**

26. **Claims 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over Hubis et al (*US Patent Number 6,343,324*) and King et al (*"Operating System Support for Virtual Machines"*) as applied to Claim 7 above, and in further view of Tang et al (*"Load Distribution via Static Scheduling and Client Redirection for Replicated Web Servers"*).

Hubis and King disclose an input/output management system according to Claim 7, wherein

a plurality of pieces of computer identification information (*Hubis, port mapping table entry 191, Figure 2B-3*) defining whether said computer or each of said application programs (*King, guest applications, figure "Type I VMM"*) can access a logical volume included in said disk device or a logical area in a logical volume (*column 4 lines 6-8*).

Hubis and King do not expressly disclose the system further comprising a schedule definition division containing said plurality of pieces of computer identification information being specified in relation to respective time zones, and in which a schedule for automatically changing the plurality of pieces of computer identification information is predefined.

Tang discloses a system comprising a schedule definition division containing a plurality of pieces of computer identification information (*hostname/IP address, section 2.1 line 3*) being specified in relation to respective time zones (*period of  $T_s$ , section 2 item 2 line 3*), and in which a schedule for automatically changing the plurality of pieces of computer identification information is predefined (*section 2 item 2*).

Regarding the limitation "a schedule definition division", Tang discloses a scheduler generating and storing assignments between client networks and assigned servers (*section 2.2 lines 1-2*). Although not expressly mentioned, it is inherent in the storing operation for the scheduler to store the assignments in an accessible way in memory. Assignments stored in an accessible way in memory can be considered a data

structure, and this data structure subsequently fulfils the limitation of a schedule definition division.

Hubis, King and Tang are analogous art in that they deal with managing the connection relationship between clients accessing data from one of a plurality of storage locations. It would have been obvious to someone with ordinary skill in the art to schedule connections in Hubis and King's storage system with Tang's scheduler.

Tang discloses that using a scheduler allows user-specific data to be migrated or located at a specific storage location (*section 1 paragraph 3 lines 11-13*) while still keeping the load on each storage location balanced (*section 1 paragraph 3 lines 13-14*).

Therefore, it would have been obvious to combine the storage system taught by Hubis and King with the scheduler taught by Tang for the benefit of minimizing data replication and balancing the load on each storage location, to obtain the invention as specified in claim 8.

**Claim Rejections - 35 USC ' 103 – Hubis and Reynolds**

27. **Claim 14** is rejected under 35 U.S.C. 103(a) as being unpatentable over Hubis et al (*US Patent Number 6,343,324*) and in view of Reynolds et al ("*The Design and Implementation of an Intrusion Tolerant System*").

28. As per **Claim 14**, Hubis discloses the input/output management method according to Claim 10, including definition information (*NURAM data structures 182, Figure 2A*) that defines whether said computer or each of a plurality of application programs running in said computer can access a logical volume included in said disk



device or a logical area in a logical volume (*column 4 lines 6-8*). Hubis does not expressly disclose the definition information being automatically modified with a system failure occurring in said connected computer as a trigger.

The limitation "*said computer or each of a plurality of application programs running in said computer*" can be fulfilled by one or more of the limitations "*said computer*" or "*each of a plurality of application programs running in said computer*".

Reynolds discloses a system wherein a computer's access is automatically modified with a system failure (*page 4 column 1 lines 7-11*) occurring in said connected computer as a trigger (*page 4 column 1 lines 33-35*).

Hubis and Reynolds are analogous art in that they both deal with the way clients access servers. It would have been obvious to one with ordinary skill in the art to combine Hubis' storage system with Reynolds failure detection system. Reynolds discloses that fault tolerant techniques usually are designed to work against faults (*page 1 column 2 lines 4-5*). Reynolds also states that faults produce vulnerabilities that can be exploited by an attacker (*page 1 column 2 lines 8-10*).

Therefore, it would have been obvious to combine the storage system taught by Hubis with the fault detection taught by Reynolds for the benefit of protection against vulnerabilities, to obtain the invention as specified in claim 14.

Though not required for the current rejection, the Examiner notes that as per the rejection of Claim 7, King ("*Operating System Support for Virtual Machines*") discloses a computer (*computer system, section 1 paragraph 1 lines 2-3*) including a plurality of applications (*King, guest applications, figure "Type I VMM"*).

**IX. CLOSING COMMENTS**

**a. STATUS OF CLAIMS IN THE APPLICATION**

29. The following is a summary of the treatment and status of all claims in the application as recommended by M.P.E.P. ' 707.07(i):

**a(1). CLAIMS REJECTED IN THE APPLICATION**

30. Per the instant office action, Claims 1-20 have received a first action on the merits and are subject of a first action non-final.

**b. DIRECTION OF FUTURE CORRESPONDENCES**

31. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sam Dillon whose telephone number is 571-272-8010. The examiner can normally be reached on 9:30-6:00.

32. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sanjiv Shah can be reached on 571-272-4201. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2185


**IMPORTANT NOTE**

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



SAD

Sam Dillon  
Examiner  
Art Unit 2185



SANJIV SHAH  
PRIMARY EXAMINER